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THE FINE AND INDUSTRIAL ARTS IN ELEMENTARY SCHOOLS

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This article presents some considerations on the place of fine and industrial arts in elementary schools. It is the first of a series in which the work of each grade will be discussed in detail.

The fine and industrial arts are steadily securing recognition as important elements in public education, and as factors necessary to industrial supremacy. In elementary schools only rudiments of these arts can be taught, such as the beginnings of free-hand drawing, simple forms of constructive work, and problems in design as related to common things. Careful work in these lines, however, is the best preparation for advanced study, and is also of definite practical value even if instruction ends in the elementary schools.

The different phases of fine and industrial art in public schools may be grouped under the following heads: (1) representation which gives pupils experience with the graphic language used in fine and constructive art; (2) construction which gives acquaintance with the methods employed in crafts and industries and trains that judgment which comes from carrying out the processes by which raw materials are converted into predetermined products; and (3) design which trains the discrimination necessary to choose what is in good taste and to enjoy what is excellent in fine and industrial art.

These phases of manual expression are not separated by sharply defined limits. It is impossible to construct an object without exercising judgment in design, or to design an object satisfactorily without some knowledge of construction and some ability in representation. The school activities continually call for simultaneous work along all three of these lines. In order to insure definite progress, however, it seems necessary to supplement general work in manual expression by special study, which will emphasize particular phases of representation, construction, and design for a period of time, and thus deal with each more thoroughly than is possible when that topic appears incidentally with others. For example, while the material for the larger part of the special study of drawing may be found in the other school subjects, it still remains true that drawing has a content of its own. To obtain the full value of this, some work is occasionally necessary, which does not relate immediately to the description of other school subjects.

The valuable results evident from these three phases of manual expression are as follows: Representation develops ability to image form clearly. If one asks children to draw from memory a supposedly familiar shape, such as the map of the country they are considering in geography, he will probably be surprised at the vague ideas of form which are discovered. If he shows the children the map for a moment, and then, removing it, asks them to draw again, and repeats this a few times, allowing no drawing while the map is in sight, he will again be surprised at the sort of attention given to the map during the brief period, which follows one attempt to draw it, and precedes another effort to reproduce it better. This attention differs greatly from that which is unaccompanied by any necessity of reproducing from memory what has been seen. The image is defined, clarified, and made comparatively permanent.

Children trained to express themselves by drawing, learn to think in terms of form. Drawing from objects requires a selection of the essential features. Out of the bewildering complexity of details which nature presents, one must learn to recognize those which are significant, which if reproduced will represent

the object. Such discrimination trains a quality of observation which is likely to remain undeveloped unless awakened by drawing.

Drawing is more completely a convention than is generally supposed. An oriental or an occidental draws each in the way he thinks will represent the form best, yet the results differ remarkably. Each is expressing himself in his own graphic dialect. The appreciation of another people's method of drawing is akin to an appreciation of another language in the revelations it gives of different ways of seeing and thinking. Drawing, as it exists at present, is an evolution. Its vocabulary has been added to by each generation. One imagines that he is expressing himself in terms suggested directly by the object, but this is only partly true. Therefore, drawing an object means translating the aspect of it into terms which demand careful selection.

In addition to these general educational values, elementary representation is of direct industrial, scientific, and aesthetic importance.

To the man engaged in constructive work, drawing offers a means of endless experimentation. Workers in metal or wood, when discussing a mechanical or constructive problem can often present its different possibilities and define the results almost as well by the use of the pencil as by manipulating the actual material. Constructive sketching is also a great stimulus of invention. The more finished working drawings, afford a means of recording all necessary data, regarding form and construction.

A manufacturer thus refers to the value of ability to sketch and draw:

> I wish to emphasize the importance of industrial drawing for the mass of trade workers in these lines of manufacturing where the artistic or aesthetic sense is not supposed to hold a prominent place. For example, in the line of machine building the art of drawing has a very important relation to our industrial future. To this particular class of mechanics drawing has a broad field of usefulness: first, because it is a valuable means of expression. The mechanic who is able to express himself by a rapidly made drawing is inspired thereby to more and better thought. Second, because it opens up for him especially a broad field for experimentation and choice.

When by a sketch the manufacturer or the mechanic can place before himself and others many ways of doing a thing, he at once makes comparisons, and immediately chooses what he deems the best, the fittest, or the most beautiful. He hits the mark after such a comparison, because with his sketches he has tried many schemes and compared them.

Experimentation, comparison, and choice mark the way of advancement. But life is too short to try many experiments, unless the methods of trying them are very simple. To build things of wood and stone and metal in order to test them, and to prove which one is best and fittest, requires too much waste of time and material. But the realm of experimentation that is possible with a pencil is wonderful and fascinating; it is almost as unlimited as is thought itself.

I have asked myself from whence comes this fascination as we find it in the shops; and I think it is because through the art of drawing, by delineating and by designing, the mechanic himself becomes a creator of things. He not only learns to see things emanating from others clearly, but, behold, he finds he can express his own ideas to himself and to others, and above all he recognizes that they are his own evolution.

For mechanics of all grades and ranks the habit of sketching and drawing becomes a great developing force. For a mechanic drawing becomes the avenue out of himself into the universe. He is not only learning about other people and other things as we do in the study of history and geography, but he is revealing himself to himself and to others, and the things revealed are new—new to him and new to the world. This to him is the inspiring quality of his work.[1]

In scientific studies, drawing quickens observation and furnishes a means of making accurate records.

Representation is also the language of the fine arts of painting and sculpture. The regular work in drawing in elementary schools, involving, as it does, continued use of lines, light and dark, and color, is giving children constant practice in expressing their ideas and observations by means of the same vocabulary which the artist himself employs. These attempts to use, even though crudely, the terms by which art is expressed, are necessary to that kind of artistic appreciation which yields the fullest pleasure.

Instructors in drawing must choose between a course planned for the few in every school who have what is commonly called

[1] From an address by Mr. Milton P. Higgins, president of the Norton Emery Wheel Co., Worcester, Mass., printed in the sixty-eighth *Annual Report* of the Massachusetts State Board of Educaton, 1904.

"talent," and a course planned for the majority of the children, within easy reach of those of no special ability. While any public-school system should ultimately take account of special talent and encourage it, yet in the elementary grades, such work should be planned as will justify itself on general grounds and be valuable for all, whatever their future occupations are to be. The plan of these articles is based upon the second policy, and the work outlined is such as can be taught by the regular grade teacher and well done by as large a proportion of the children as can accomplish the work given in other subjects.

In order to carry out such a plan it is necessary to teach drawing in the most direct and simple way possible, testing all methods by the resulting increase in ability to draw on the part of the majority of the children. A lack of such increase in the many, should be interpreted as a fault of the method rather than of the children. Results have already shown that the majority of children can learn to draw sufficiently well for purposes of ordinary practical expression with pencil or brush, and can be led to appreciate what is in good taste, as readily and generally as they can progress in other studies of the school curriculum. Special talent is no more a factor to be reckoned with in elementary drawing than in elementary language or mathematics.

Constructive work makes possible a proper balance of motor and intellectual activities which is to the advantage of both. School authorities sometimes discuss the question as to whether any time in the burdened school curriculum can be spared for occupations involving muscular activity, and presume to settle the matter by official action. The nature of children has already settled that question in the affirmative. Muscular activity will be an important part of any school programme. The only jurisdiction which the authorities have in the matter is in deciding whether these activities shall hinder or help school work, whether they shall appear as mischief-making or manual arts.

Elementary woodwork gives familiarity with common tools, processes, and materials, and develops a comprehension which every householder should possess of problems of ordinary constructive work. It brings the invigoration of dealing with the

unvarying, impartial laws of matter and being compelled to face the obvious fitness or unfitness of visible results. It awakens the healthy pleasure of shaping material to a predetermined form by patience, foresight, and skill.

Constructive work is not only an essential element in general education, valuable alike to the scholar and the artisan, but is also a means of awakening industrial interests and promoting industrial efficiency. The fact that about two-thirds of the school population leave at the end of the eighth grade and go to work should be considered in its full significance by teachers of the manual arts. These children are too young to enter skilled industries. A few rise through any circumstances, but the majority drift from one to another unskilled occupation taking whatever pays best. They spend two important years in employments which present no industrial interests and offer no vocational outlook.

A teacher of manual training who explores industrial life for educational suggestions will often find forms of work-teaching which awaken interest in effective ways of doing things and bring discontent with unskilled work and foster a desire for thorough industrial training.

The study of design in elementary schools should aim first to develop good taste regarding the things which make up the environment of everyday life.

The power to discern between the merely pretty with attractiveness which is superficial and transitory, and that which is permanently and universally beautiful, gives capacity for an enjoyment the possibilities of which are unlimited.

Among the problems in design especially appropriate for public schools are school and home surroundings, the artistic possibilities of the community and of local industries and crafts.

Every home is an example of good or bad taste. Whatever develops aesthetic judgment raises the standard of living. The general appearance of written school work, arrangement of plants and flowers, framing and hanging of pictures, choice of wall papers, rugs, furniture, etc., are among the opportunities for that sense of fitness which is artistic taste.

Unless the problems of design relate to familiar surroundings, pupils are likely to consider the term "artistic" as one which applies only to unusual things, whereas it does not describe the class to which an object belongs, but means that the object, because of its adequacy, and the refinement of its essential parts and proportions, and the grace and fitness of its decoration, if it possesses any, is unusually excellent of its kind. A kitchen chair or utensil may be artistic and thus a source of continual pleasure as truly as may a vase or a picture.

By collections of photographs or other representations children should be interested in ways in which towns and cities are solving the problems of public structures. They should see pictures of the best designs for bridges, water fronts, public buildings and private houses of all classes, park furnishings, sculpture, fountains, and other things which may contribute to beauty in modern communities.

Schools should give some acquaintance with noted examples of drawing, painting, and sculpture. Abundant material is at hand in the shape of photographs, illustrations, and the best of modern color prints.

The main question, however, is not how many pictures can be brought within the child's range of vision, but on how many can his imagination be awakened to lay hold. In the days when pictures were fewer, a child would often pore for a long time over some poor print till his imagination wandered far into its perspective and lived with its characters. Such a print grew to be so full of suggestion that in later years the grown man hesitated to throw it away even after he had come to see its artistic worthlessness. Even the wayward cracks in the walls of old bare schoolrooms became interesting to the imaginations of children who pictured scenes among them as one sees constellations in the stars.

When imagination can be set at play under the stimulus and direction of a good picture, feelings may be awakened that later may develop into aesthetic enjoyment.

Many small pictures distract the attention of the pupils. Two or three excellent pictures in a classroom, appropriately chosen

and carefully hung, usually have a finer influence and give more enduring memories than a large number scattered about the walls.

The fine and industrial arts are taught in schools because of their close relation and definite value to the life and work of people at large. During the past few years there has been steady improvement in the quality of instruction and an excellent foundation for further progress has been laid.

We are confronted, however, with the somewhat surprising fact that in many cities and towns people who as children have spent eight years in the elementary schools and four years in high school, and have studied drawing and constructive work during most of the time, are unable to use drawing at all freely or correctly. They find that their public-school course has added little to their natural ability to choose things in good taste in dress and home furnishings, and this course has increased but slightly their appreciation of works of art. In industrial fields, employers say that boys come to them after a study of constructive work and working drawing taken in grammar schools and high schools, exhibiting a lack of ability to read plans and blue prints. College professors remark that students from these same schools have no skill in delineation of form and cannot make accurate graphic records of observations. Even those who have attended normal schools and have become teachers often confess that they cannot draw and hesitate to use the blackboard for purposes of illustration. These facts justify a careful consideration of the purpose and scope of these subjects in elementary schools, and of the most effective methods of accomplishing the aims in view.

One reason for the tardiness with which these conditions are disappearing is that the problems for manual expression have too often been artificial. Two influences will contribute toward more effective teaching: (1) Supervisors of manual arts who are students of the aim and spirit of the school curriculum as a whole. To such a supervisor the general teachers' meetings held by the superintendent will be as valuable to him as to the grade teachers. He will gather hints from superintendent, from teachers, from the children in their work and play and home life, and from the

local industries and the needs of those engaged in them; and from the natural and architectural features of the town. These will modify his work, which will aim to present what the arts have to offer in promoting industry and making life more enjoyable. (2) Grade teachers who make use of manual expression in school work. In promoting drawing for instance, the most effective influence is the example of a teacher who is accustomed to draw on the board before the children. Compared with the effect of this, methods and courses without such example are of secondary importance. We must look to the normal schools for training which will lead teachers to use the arts in this way. The place of the arts in school is realized by the teacher who found them necessary and helpful to his own general work and standing in the normal school. Teachers thus trained cease to regard as specialties such beginnings of the arts as are appropriate to elementary schools. The study of these becomes a simple and natural training in one of the fundamental requisites of civilization.

MEASUREMENT OF GROWTH AND EFFICIENCY IN ARITHMETIC

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The following pages describe in some detail the efforts of the writer to establish a standard from which to measure the success or failure of a reorganization of the mathematics courses in his charge, and to trace the development of ability in arithmetic from the primary grades through the high school. Such tests, repeated at frequent intervals, would, it seems to the writer, make standardization of yearly work possible, would show exactly the place, manner, and amount of development of any particular ability, and would give a rational basis for the estimation of the influence exerted by any method, material, or teacher.

The direct inspiration of the experiment was No. 19, of the *Teacher's College Series, Contributions to Education,* published by Columbia University and entitled, "Arithmetical Abilities; Some Factors Determining Them," by Dr. C. W. Stone. For the benefit of those who are not familiar with that publication, a brief summary of one or two of the essential points is given.

Dr. Stone visited and personally gave, under conditions as nearly identical as possible, two tests, one in fundamentals and one in reasoning, to 3,000 sixth-grade children in 26 school systems in 6 different states from Indiana to New York. The tests are given in full on pp. 61 and 64 although the method of scoring there found is not that used by Dr. Stone. Dr. Stone made a careful examination of the course of study, time allowance, character of supervision, etc., of each school, but with these we shall not be concerned. The scores made by the different schools show that, taking the efficiency of the school making the highest score in fundamentals as 100 per cent., the efficiency represented by the median score was 76 per cent., that of the lowest score 45 per cent. In reasoning the results were even

worse, the median score representing an efficiency of 60 per cent., the lowest score an efficiency of 39 per cent. In other words, for most schools the work that is now done in four years could be accomplished in three for fundamentals, and two and a half for reasoning, if more efficient methods were adopted. If the time element is considered, the results are much worse; for the percentage of the school time given to arithmetic was found to vary from 7 to 23 per cent., and high ability appeared more commonly with the small rather than with the great expenditure of time. It was not possible to say what are efficient methods; for there was wide variation even among schools using essentially the same method and the same general course of study.

Moved by the laudable ambition of finding the place of the school with which he is connected among the 26 school systems, the writer undertook to give Dr. Stone's tests to the sixth grade. A little consideration made it evident that parts of the tests were within the abilities of third-grade children, while the length of the tests would provide work to keep even the seniors busy during the whole of the allotted time. Here then was a means of testing the development of the arithmetical abilities throughout the school, and with the consent and co-operation of the principal, Dr. Stone's tests were given under as nearly identical conditions as possible to every grade in the school from the third to the thirteenth, or last year in the high school, inclusive. The tests thus became a measure, not only of the ability gained during the eight years of arithmetic, but also of what happens to that ability as the child undergoes the training of her high-school mathematics and science. Before considering the test itself, however, the reader needs to know something of the school and of the conditions under which the ability tested was gained.

The school in question is a private school for girls. The total enrolment last year (1908–9) was 317, making the average number of girls in a grade 23. Any class is sectioned as soon as its membership rises above twelve, and further provision is made, through a system of "interviews" for a careful, yet legitimate, assistance of the weaker members. The method of instruction is thus distinctly "individualistic." Girls are received in the

kindergarten, carried through eight grades in the elementary school, five in the high school, and are then admitted to the leading colleges without examination. Approximately half the girls take the college course. This past year, for instance, there were 24 graduates of the school enrolled in Vassar College alone.

The instruction in arithmetic, as in other subjects, has during the last ten years undergone radical changes. Complaints of lack of ability in arithmetic shown in the laboratory work in science has lead to correlation between the two subjects, and the gradual adoption of laboratory methods in arithmetic itself, while many laboratory exercises and methods are making their way into the algebra and geometry classes of the high school. Two years ago the two subjects, science and mathematics, were made one department, under the control of one head, and a strict, objective laboratory system of instruction adopted throughout. It will be noted that the past few years have been a transition period and the conditions of teaching have been unsettled. The changes may be described as an adoption of the cyclic-objective method in place of the topic-drill method. At the present time grades 1–4 have had a fair amount of laboratory training, grades 5–7 a small amount for one year, grade 8 a large amount for one year, grades 9 and 10 a less amount for a year, and grades 11, 12, 13 none except through their science work. Part of grade 13, however, reviewed algebra and geometry during the year, following the general plan of the new method, but with few laboratory exercises.

The general method of giving the tests was that followed by Dr. Stone. The examples were typewritten and the paper fastened to a sheet of blank paper by means of a clip so that the typewriting was on the inside. These papers were distributed in the assembly rooms of the school, the whole of each division of the school being tested at one time. The girls were told to write their names and grades on the blank sheet, but not to look at the examples until given a signal. It was explained that the purpose was to test the ability of the whole school in arithmetic, not the individual, but that each must do her best for the honor of her class. Then the signal was given and at the end of the allotted

time, twelve minutes for fundamentals, fifteen for reasoning, another signal was given and the papers collected. The tests were given on successive days at about the middle of the morning near the close of the year. The children did not know the tests were to be given, nor how much time they were to have.

The test in fundamentals and the score in points for each example (see below) was as follows:

ARITHMETIC TEST

Work as many of these problems as you have time for: work them in order as numbered.

		SCORE IN POINTS
1. Add:	2375	
	4052	
	6354	19 additions.
	260	
	5041	
	1543	
2. Multiply 3265 by 20.		2 additions, 5 multiplications.
3. Divide 3328 by 64.		2 additions, 3 subtractions, 4 multiplications, 2 divisions.
4. Add:	596	
	428	
	94	
	755	
	302	20 additions.
	645	
	984	
	897	
5. Multiply 768 by 604.		7 additions, 7 multiplications.
6. Divide 1918962 by 543.		6 additions, 10 subtractions, 12 multiplications, 4 divisions.
7. Add:	4695	
	872	
	7948	
	7499	28 additions.
	6786	
	567	
	858	
	9447	
8. Multiply 976 by 87.		8 additions, 6 multiplications.

9. Divide 2782542 by 679.	6 additions, 7 subtractions, 9 multiplications, 4 divisions.
10. Multiply 5489 by 9876.	28 additions, 16 multiplications.
11. Divide 5099941 by 749.	6 additions, 7 subtractions, 9 multiplications, 4 divisions.
12. Multiply 876 by 79.	9 additions, 6 multiplications.
13. Divide 62693256 by 859.	10 additions, 13 subtractions, 15 multiplications, 5 divisions.
14. Multiply 96879 by 896.	28 additions, 15 multiplications.

It will be noticed that the ability tested is that involved in the handling of abstract numbers in addition, multiplication, division, and (incidentally in division) subtraction. Speed and accuracy in such work are certainly fundamental in all mathematics, and whatever else the course in arithmetic may give, it must produce such ability. Criticism of the test itself will be made later.

The papers were scored in two different ways. By the first method, called hereafter "by examples," each example attempted gave a count of one. When the correct answer was obtained the example was scored as one right. If the answer was wrong for any reason it was not scored in the second count. For instance an example copied wrong but worked correctly was counted one attempted, but not one right, as was also example 6, worked correctly but marked example 4. A record was kept by name and grade of the examples attempted (Attempts), and the examples right (Rights). The individual scores were analyzed into examples in addition, multiplication, and division. Here a record was made, for each example wrong, of the character of the mistake, whether in addition, subtraction, multiplication, division, or copying or carrying. The total for each grade was found from the individual records.

The second method of scoring was "by points." It grew out of a desire to analyze the papers and mistakes on a basis of mental effort involved, but proved rather unwieldy and unsatisfactory. It was found that no two persons would use quite the same judgment in analyzing a paper, and that it was difficult for even a single individual to follow a consistent system. The scores and the results are given, however, as with a suitable test, such a system of scoring would be of value. In the main, the

results obtained even in this test are believed to be correct within two or three percentages, all the scoring being done finally by one person. For several grades the scores were marked separately by two individuals and the results compared. For all the grades the different points scored made a certain checking of the results necessary and this also contributed to the general accuracy.

In detail the scores by points as given were determined as follows:

The first example given above was

Add:	2375
	4052
	6354
	260
	5041
	1543

In solving this example the child in the third grade goes through four additions for the first column; 3+1=4; 4+4=8; 8+2=10; 10+5=15: six additions for the second column; 1 (carried) +4=5; 5+4=9; 9+6=15; 15+5=20; 20+5=25; 25+7=32: four for the third column, and five for the last column, a total of 19. If the answer to example 1 were given as 19,685 (correct answer, 19,625), the child was given a score of 19 points in addition attempted, 13 points (the total 19, less the additions in the second column, 6), right. In multiplication and division the attempt was made to separate the incidental additions and subtractions from the multiplications and divisions. For instance, in example 3,

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64)3328(52
 320
 ---
 128
 128
 ---
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the steps are 33÷6=5, one point in division; 5×4=20, one point in multiplication; 5×6=30, one point in multiplication, 30+2 (carried)=32, one point in *addition;* 0 from 2=2, one point in *subtraction:* 2 from 3=1, one point in subtraction, and so on, the total score for a correct answer being, as given, 2 additions, 3 subtractions, 4 multiplications, 2 divisions. In some respects the scores were arbitrary assignments of value, as when the recognition of 128 as equal to 128 was counted as one point in subtraction, but in all such cases the same scores were used throughout and affected all alike. In most cases it was comparatively easy to form an opinion as to whether a mistake was in the actual multiplying and dividing or in the carrying. For instance, when 5×543 was given as 2,615, the multiplication 5×5=25 was counted as correct and the mistake that of carry-

ing 1 in place of 2 from the previous 21. This was counted as a mistake in addition. If 6×768 was given as 5,208, the four from the previous 40 was probably carried correctly and the mistake one of multiplication, 6×7 being called 48. In other cases the character of the mistake was not so plain and the classification a mere guess. Most mistakes in multiplication, however, seem to consist in the substitution of one part of the multiplication table for another. This and other similar experiences formed a basis from which judgments could be made. After all the papers had been scored as above, they were gone over a second time and the attempt was made to separate mistakes in carrying and copying from all others. These were called mistakes due to faulty attention (A).

As to whether it is worth while, or not, to give the time needed for such careful scrutiny of each result, there will undoubtedly be two opinions. The writer wished to know, however, whether the children performed the different operations with equal ease, and in case of failure, to what the failure was due. It is manifestly useless to drill children on the multiplication tables for instance, if failure in multiplication is due to inability to carry, and it is equally useless to attempt elaborate examples in multiplication and division if the fundamental combinations are imperfectly mastered. The writer personally considers his time well spent, but the results must speak for themselves.

The test for reasoning, and scores by points, was as follows:

ARITHMETIC TEST

Solve as many of the following problems as you have time for; work them in order as numbered.

1. If you buy two tablets at 7 cents each and a book for 65 cents, how much change should you receive from a two-dollar bill?

SCORE

2—[(2×7)+65]. One point each for addition, subtraction, and multiplication.

2. John sold 4 *Saturday Evening Posts* at 5 cents each. He kept ½ the money and with the other half he bought Sunday papers at 2 cents each. How many did he buy?

SCORE

4+5=20. 20÷2=10. 10÷2=5. One point for multiplication and two for division.

3. If James had 4 times as much money as George, he would have $16. How much money has George?

SCORE

16÷4=4. One point for division.

4. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents?

SCORE

50÷5=10. 10×2=20. One point for multiplication, one for division.

5. The uniforms for a baseball nine cost $2.50 each. The shoes cost $2 a pair. What was the total cost of the uniforms and shoes for the nine?

SCORE

(9×2.50)+(9×2). One point for addition, two for multiplication.

6. In the schools of a certain city there are 2,200 pupils; ½ are in the primary grades, ¼ in the grammar grades, ⅛ in the high school, and the rest in the night school. How many pupils are there in the night school?

SCORE

2,200÷2=1,100. 2,200÷4=550. 2,200÷8=275. (1,100+550+275)=1,925. 2,200—1,925=275. One point for addition, one for subtraction, three for division.

7. If 3½ tons of coal cost $21, what will 5½ tons cost?

SCORE

5.5(21÷3.5). One point for multiplication, one for division.

8. A newsdealer bought some magazines for $1. He sold them for $1.20, gaining 5 cents on each magazine. How many magazines were there?

SCORE

1.20—1=.20 20÷5=4. One point for subtraction, one for division.

9. A girl spent ⅛ of her money for carefare, and three times as much for clothes. Half of what she had left was 80 cents. How much money did she have at first?

SCORE

1/8+3/8=4/8. 1—4/8=4/8. 4/8÷2=1/4. 80×4=3.20. One point each for addition, subtraction, division, and two for multiplication.

10. Two girls receive $2.10 for making button-holes. One makes 42, the other 28. How shall they divide the money?

SCORE

42+28=70. 2.10÷70=.03. .03×42. .03×28. One point each for addition and division, two for multiplication.

11. Mr. Brown paid ⅓ the cost of a building; Mr. Johnson paid ½ the cost. Mr. Johnson received $500 more annual rent than Mr. Brown. How much did each receive?

SCORE

1/2—1/3=1/6. 500×2. 500×3. One point for subtraction, two for multiplication.

12. A freight train left Albany for New York at 6 o'clock. An express left on the same track at 8 o'clock. It went at the rate of 40 miles an hour. At what time of day will it overtake the freight train if the freight train stops after it has gone 56 miles?

SCORE

56÷40=1.4. .4×60=24. 8+1:24=9 $24. One point each for addition, multiplication, and division.

This test was scored in the same two ways as the test on fundamentals, by examples, and by points. It will be noted from the scores given that a point stands for a single operation, a three-step problem counting three points. Individual and grade records were kept as before, each score being analyzed in the same way. Mistakes in the work were grouped in several classes. Using 8 cents instead of 7 cents in problem 1 was called a mistake in attention (A); adding the difference of 65 and 14 to 2.00 was called a total failure to comprehend the meaning of the example (T); using 1 block at 7 cents instead of 2 was called a mistake due to incomplete reading or appreciation of the English of the example—a mistake in attention (A)—such mistakes were not made by those who re-read the problem for the purpose of checking their work; problems correctly planned but containing mistakes in the work were said to be wrong because of mistakes in fundamentals (F).

Besides these general records, a special record was kept of the number of examples in which there was an attempt to use either

algebra or proportion. Approximately 100 girls were in possession of enough algebraic skill to have enabled them to use simple equations had they cared to do so, although the fact that the paper was marked "Arithmetic Test" would have influenced many against the use of algebra. The neatness of the papers in both tests was also recorded in a rough way, two grades of neatness only being recognized—neat and untidy. Each paper was scored twice, however, and the doubtful ones near the dividing line gone over a third time. A paper was judged neat when its examples were arranged in a clear orderly fashion, properly numbered, and were without serious blots or untidy marks and figures. A record was kept, also, of the perfect papers.

Before leaving the subject of scoring, it might be well to say again that many of the judgments upon which the scores were based were quite arbitrary in their nature, but that as nearly as possible the scoring was uniform throughout. In scoring by points allowance was made for individual variation by making up new scores of the same character where the individual had worked the problem in a longer or shorter way. That is, the scores by points represent scores upon the work that each individual put upon her paper, while the scores by examples show

TABLE I. PART 1

TOTAL GRADE SCORES

Actual results

"F".refers to fundamentals; "R" to reasoning

GRADE	NO. IN GRADE		FUNDAMENTALS				REASONING			
			Examples		Points		Examples		Points	
	F	R	At	Rt	At	Rt	At	Rt	At	Rt
3.....	12	12	23	3	441	237	41	20	97	71
4.....	16	16	67	40	1005	891	81	57	203	175
5.....	22	22	130	81	2266	2080	186	94	538	383
6.....	13	12	82	57	1585	1463	112	48	323	202
7.....	23	22	160	120	3062	2889	189	123	555	455
8.....	21	21	181	131	3634	3344	204	150	580	507
9.....	18	18	136	108	2566	2474	178	129	518	439
10.....	21	21	189	139	3719	3566	217	167	632	559
11.....	23	25	177	144	3305	3155	255	218	768	710
12.....	33	29	264	203	5136	4840	279	223	828	740
13.....	16	19	147	122	3090	2998	198	160	599	531
	218	217	total number taking tests.							

TABLE I. PART 2

TOTAL GRADE SCORES

Scores used for comparison of grade achievements. Computed on basis of uniform grades of 25 members each

" F " refers to fundamentals; " R " to reasoning

GRADE	MULTIPLIER		FUNDAMENTALS				REASONING			
			Examples		Points		Examples		Points	
	F	R	At	Rt	At	Rt	At	Rt	At	Rt
3.....	2.08	2.08	48	6	917	493	85	42	202	148
4.....	1.56	1.56	103	62	1567	1390	126	89	317	273
5.....	1.14	1.14	148	93	2583	2371	212	107	613	437
6.....	1.93	2.08	158	110	3059	2824	233	100	672	420
7.....	1.09	1.14	174	131	3338	3149	215	140	633	519
8.....	1.19	1.19	216	159	4324	3979	243	178	690	603
9.....	1.39	1.39	189	150	3566	3439	247	179	720	610
10.....	1.19	1.14	225	165	4426	4243	247	190	720	637
11.....	1.09	1.00	193	157	3602	3439	255	218	768	710
12.....	.76	.86	201	155	3903	3678	240	192	712	636
13.....	1.56	1.32	231	191	4820	4677	260	211	791	700

how nearly the individual came to perfection. In each a mistake counted, but by points a careless inverting of two figures would deduct a single point, while by examples the paper lost the whole score for the example. Both scores should be considered in estimating the ability of a grade.

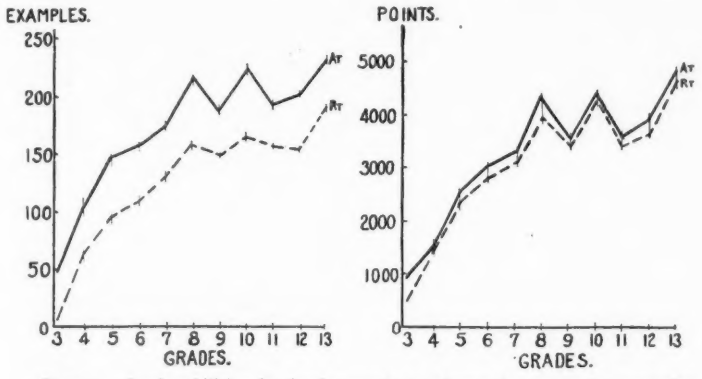
The results of the tests are given in the accompanying tables and graphs.

It is obviously unfair to compare the achievements of a grade with 33 members with that of a grade containing but 12 members. Accordingly these results have been equalized by computing what they would have been if the grade membership in each case had been 25.

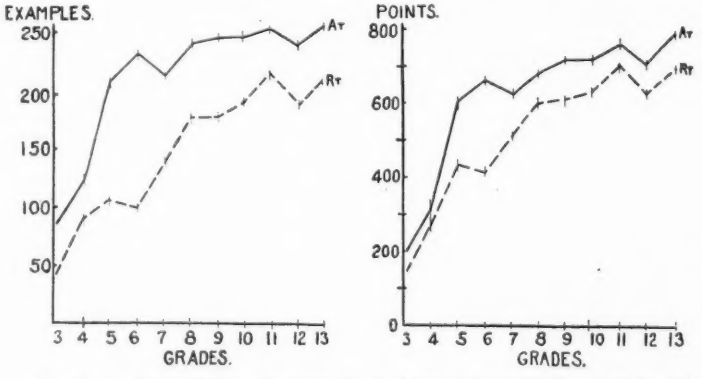
Graphically the results in Part 2 may be represented as shown in Plots 1 and 2.

The interpretation of the curves obtained is difficult in the absence of standards with which to compare the results. It must be remembered throughout this discussion that the inferences and conclusions made are from a single measurement only and are therefore tentative except as the writer is able to bring additional evidence to bear from his knowledge of the classes and conditions. It will need the tests of several years to eliminate

differences due to variation in ability and class spirit alone. The factors determining ability are so many and their individual effects so little known that the results of the present test will



PLOT 1.—Grade abilities in fundamentals as shown by scores in examples and points, Table I, Part 2.



PLOT 2.—Grade abilities in reasoning as shown by scores in examples and points, Table I, Part 2.

furnish at best merely a working hypothesis for the planning of the next year's work, which hypothesis must stand or fall by the results of next year's tests.

Certain facts, however, seem to the writer to stand out plainly. The test in fundamentals appears to have been more difficult than that in reasoning. The latter, in attempts at least, rises to a maximum earlier. Criticism of the test on reasoning will be made later. In the general development of ability there seems to be a rapid and quite uniform rise during the grammar grades and a slight but steady rise during the high-school period. Grade variations in ability make the meaning of the changes in the curve in the upper grades doubtful. It may be that grades 8 and 10 are of exceptional ability and the other grades represent the normal results. On the other hand, and this supposition seems the more probable from experience in teaching the various classes, it may be that grades 6, 7, 9, 11, and 12 are poor classes, and the true standard curve should follow the crests instead of the troughs of the present curves. Grades 6 and 9 are notoriously poor, grade six because of a peculiar history and grade nine because of poor ideals of work. The real test of the effect of high-school mathematics will come as the results of a good class, as the eighth grade, are successively known through the upper grades. It is to be remembered also that a change of system has been taking place, and that grades 11, 12, and 13 may mark the highest achievements under the old régime. For the present it is a pleasure to know that the eighth grade, which has been given a large amount of the new training, is at least not below the standard of any class except the seniors, and it may not be out of place to call attention to the fact that if high-school mathematics does add to ability in arithmetic, the present eighth grade ought to set a new senior record by the time it has finished its course.

It is to be noted that the curves of ability by examples and by points are of the same general character, differing mainly in the degree of accuracy shown. Such differences are due to the character of the mistakes as explained under the discussion of scoring. Hereafter, plots will show either one set of scores or the other unless there is marked difference between them.

The inaccuracy of grades 5 and 6 in the reasoning test needs explanation. These two grades work with fractions and attempted every example containing the fractional idea. It can

be seen from the test, however, that some of the problems dealt with the principles of partition, about which these classes have learned nothing. Nevertheless, that the sixth grade should succeed in solving less problems than the fifth grade shows the necessity for special and vigorous training if the class as a whole is ever to come up to the standards of the other classes. Yet here again who can say that the factors which have contributed to this result may not operate at a later period to give increased ability?

In comparing the curves for fundamentals with those for reasoning, it will be noted that some classes are high in both, or low in both, while others are high in one and low in the other. This corresponds to classroom experience. The child that can reason well but is poor in abstract work usually passes with the child that is perfect in abstract work and poor in reasoning. This suggests that the truest measure of the abilities of the grades would be a combination score from both tests. It is manifestly unfair to combine 4,820 points in fundamentals with 791 points in reasoning, the achievements of the thirteenth-grade class. Accordingly, in Table II, the scores of Table I, Part 2, have been

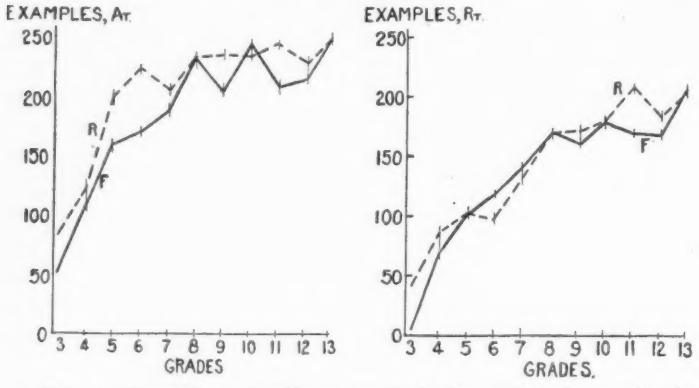
TABLE II

PART 1. Comparison scores of Table I, Part 2, adjusted to equality of achievement in fundamentals and reasoning. Thirteenth-grade attempts in both tests called 250 in examples, and 5,000 in points. Other scores given proportionate values.

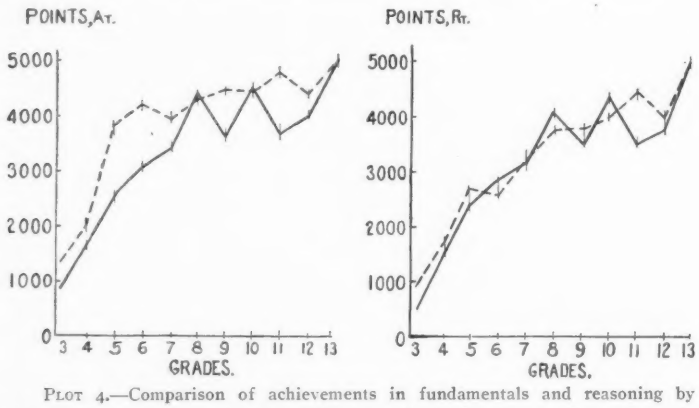
PART 2. Total achievements of the grades. Sum of F and R scores Part 1 for each grade.

GRADE	FUNDAMENTALS				REASONING				TOTAL SCORES			
	Examples		Points		Examples		Points		Examples		Points	
	At	Rt	At	Rt	At	Rt	At	Rt	At	Rt	At	Rt
3.....	51	6	952	508	82	40	1277	934	133	46	2229	1442
4.....	111	67	1628	1443	121	85	2003	1726	232	152	3631	3169
5.....	160	101	2682	2482	204	103	3874	2761	364	204	6556	5223
6.....	171	119	3177	2930	224	96	4248	2654	395	215	7425	5584
7.....	188	142	3463	3267	207	136	4000	3280	395	278	7463	6547
8.....	234	172	4487	4131	233	171	4361	3811	467	343	8848	7942
9.....	205	162	3703	3568	237	172	4550	3855	443	334	8253	7423
10.....	244	179	4593	4403	237	182	4550	4025	471	361	9143	8428
11.....	209	170	3739	3568	245	209	4854	4487	454	379	8593	8055
12.....	217	168	4051	3819	230	184	4500	4019	447	352	8551	7838
13.....	250	207	5000	4856	250	203	5000	4424	500	410	10000	9280

equalized by calling the thirteenth-grade achievements in both fundamentals and reasoning an arbitrary equal value and recomputing the other scores to correspond. The values chosen were



PLOT 3.—Comparison of achievements in fundamentals and reasoning by examples. Scores recomputed and equalized on a basis of 250 for the 13th grade attempts. Full lines show fundamentals; dotted lines show reasoning.

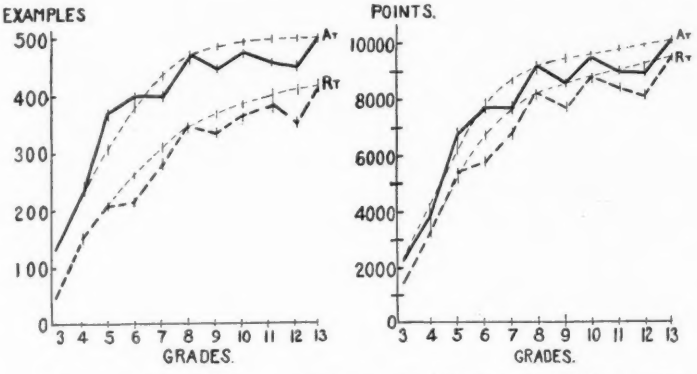


PLOT 4.—Comparison of achievements in fundamentals and reasoning by points. Score recomputed and equalized on the basis of 5,000 for 13th grade attempts. Full lines show fundamentals; dotted lines show reasoning.

250 for examples, and 5,000 for points. Plots 3 and 4 show the relations between the equalized scores graphically. The combined scores are also given and are shown graphically in Plot 5.

Plots 3 and 4 make very plain the different types of ability. Grade 12 is seen to be comparatively poor in both tests, grades 9 and 11 good in one and poor in the other, grade 8 good in both. It is certainly a significant fact that grades 5, 8, 10, and 13, taken as representing the normal abilities, should have equal ability in the two tests.

The characteristics of the different grades and the general trend of the development is at once apparent from the curves



PLOT 5.—Total ability as shown by combination of equalized scores. Light dotted curves show probable normal product of present conditions.

obtained from the combination scores, Plot 5. It will be noted that grades 5, 6, and 12 are inaccurate; grades 7, 9, and 11 somewhat below normal in ability. The combination scores have evidently made less the marked variations in ability present in the scores for either test alone. The meaning of this is not apparent to the writer. It has been a puzzling fact of his teaching experience that ability to reason and ability to be exact in abstract work seldom go together. He is inclined to believe that there is a psychological principle at work, which, if known, would solve more riddles than one in educational procedure. Whatever the explanation, statistical proof of the fact is given here.

On Plot 5 are drawn in light dotted lines the curves that will be taken as representing the normal product of the training

given in the school at present (1909). These will serve as standards from which to judge of the effects in changes and methods in the years to come. There are slight differences in form between the curves by examples and those by points, but the most noticeable feature of the plot is the change in accuracy. Accuracy gradually decreases through the grammar grades and increases through the high-school grades at about the same rate. If this result is confirmed by future tests, there is an important lesson here. If inaccuracy in grades 7, 8, and 9, is due to some natural cause outside of arithmetic proper, to insist on accuracy or to spend much time in working for it may be not only wasteful, but harmful. These curves not only furnish a standard of accuracy for the different grades but a measure of the effect of accuracy as well. For instance, in the thirteenth grade, being able to perform correctly 93 out of a hundred operations (as 3×4, $8-5$), means an efficiency of 83 per cent. in working examples like those in the test.

[*To be continued*]

OUR INHERITED PRACTICE IN ELEMENTARY SCHOOLS

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Many who are interested in the training of elementary teachers are questioning the value of the history of education. Could not the time be spent to better advantage on a more direct study of present educational practice? The critics of the history of education may admit that doubtless any serious consideration of education by students helps them somewhat in their thinking. They will contend, however, that too much rumination about theories as theories, with no occasion for application, develops habits of pure speculation which not only waste time, but often interfere with efficiency. When this speculation concerns itself with situations and thought, hundreds or thousands of years removed, there is little chance of its functioning in the actual work of the young teacher.

Without attempting to argue the matter out with these critics, we may fall back on the simple consideration that the history of education will continue for some time to form a part of most normal-school courses. As long as this is the case, it is important to put into the instruction such content as will be most likely to modify the everyday thinking and practice of the students. Looked at from this standpoint, the material ordinarily found in the histories of education may be roughly classified as follows in the order of increasing value:

1. The history of philosophy masquerading as the history of education. The substitution of this material for education results from the fact that courses in education have often developed in higher institutions in departments of philosophy, and the speculations of philosophers about education have been most accessible for treatment. Material of this sort is almost meaningless even to many graduate students; it is certainly incomprehensible to the

great majority of normal-school students, and its connection with practice is very remote.

2. Biographical accounts of the more concrete writers on education, such as Montaigne, Ascham, Locke, and Rousseau. Quick's *Educational Reformers* is the best example of this type of history of education. Such material as that presented by Quick is so simple that normal-school students understand it. Much of it belongs rather to the history of literature than to the history of education. It serves the purpose of introducing students to a consideration of many educational questions in an unsystematized form, as, for example, through Montaigne's discussion of the futility of memorizing. These writers are, however, generally studied without adequate historical setting. The student does not realize the social and educational situation which confronted them nor does he appreciate the effects of their works on future practice.

3. Summaries of the more obvious aspects of education in various parts of the world beginning with China 2,000 years before Christ and coming down to the present century in America. Often all of this is contained in small volumes of about 300 pages. The worthlessness of such skeleton outlines of historical development has long been admitted in history courses which have for their sole aim information and culture. As material which may function in modifying a teacher's attitude and practice, a cursory outline is even more worthless. Changes in education are relatively meaningless to the student of such a text, because the social situation from which these changes arise and which they in turn modify, is not presented.

4. Type studies of limited periods, with their social and economic and material setting. One of the best examples of this kind of history of education is the account of Renaissance education given by Professor Woodward, of England. The classical humanistic education is filled with meaning for the student as he realizes that it was a necessary consequence of the life of the castles and city states of northern Italy. Such a study continued down to the present time should furnish a valuable perspective for those interested in practical problems of high-school cur-

ricula. An appreciation of our inherited practices in high schools thus gained from an examination of the historical setting of such schools may become a strong factor in rationalizing a teacher's attitude toward high-school problems.

This fourth kind of treatment of the history of education, namely, type studies of limited periods, showing the social, economic, and material conditions of the period, is possible in normal schools for elementary teachers. Some material for such a course is now available and a few chapters will be presented in this and subsequent papers. The period of central interest will be the time from the American Revolution to the present day. To understand the conditions of educational practice about 1775 it will be necessary to devote the remainder of this first paper to a brief consideration of the period just prior to the Revolution.

In the New England colonies a bookish elementary education originated from the demand that everyone read the Bible.

Most teachers are familiar with the life and character of the New England Puritans. Their educational practice followed logically from their mode of life. Let us review a few of their characteristics, important from this standpoint.

In the first place the Puritans were religious reformers, a part of the Protestant Reformation. Theoretically, they believed in the principle that an individual's religion was a matter between himself and God, and that a study of the Bible was the way to religious truth. They had rejected the authority of the church of Rome and the dogmas that had developed in the Middle Ages. They desired to "purify" the English church even further and reject prayers read from a book, the surplice, and all other religious forms. As Fischer expresses it, "They wanted to reduce Christianity to its most primitive form of four bare walls and the literal words of the Bible."[1] They came to America to establish a condition of religious life in accordance with these ideals. To be sure, they soon developed canons of religious orthodoxy almost as narrow and bigoted as any that had been held during the Middle Ages, and that were utterly inconsistent with the freedom of conscience which the Reformation advocated. But reli-

[1] S. A. Fischer, *Men, Women, and Manners in Colonial Times,* Vol. I, p. 125.

gion continued to be their chief interest, and the Bible the central object of study. As Elson says, "The state was founded on religion and religion was its life. The entire political, social, and industrial fabric was built on religion."[2]

The intense interest in the Bible and the prominent place it occupied in their intellectual and religious life is most significant. The same condition existed in Puritan England and is described by Green in these words:

> England became the people of a book and that book was the Bible. It was as yet the one English book that was familiar to every Englishman; it was read at churches and read at home, and everywhere its words, as it fell on ears which custom had not deadened, kindled a startling enthusiasm. The popularity of the Bible was owing to other causes besides that of religion. The whole prose literature of England, save the forgotten tracts of Wyclif, has grown up since the translation of the Scriptures by Tyndale [1525] and Coverdale [1538]. So far as the nation at large was concerned, no history, no romance, hardly any poetry, save the little-known verse of Chaucer, existed in the English tongue when the Bible was ordered to be set up in churches. Sunday after Sunday, day after day, the crowds that gathered around Bonner's Bible in the nave of St. Paul's, or the family group that hung on the words of the Geneva Bible in the devotional exercises at home, were leavened with a new literature. The power of the book over the mass of Englishmen showed itself in a thousand superficial ways, and in none more conspicuously than in the influence it exerted on ordinary speech. It formed, we must repeat, the whole literature that was practically accessible to ordinary Englishmen.[3]

Such was the intellectual life of the New England Puritans. It was intense and vigorous in its way. This is shown by the attendance on sermons, Sunday morning and afternoon, note-taking at such sermons, long theological discussions. But it lacked many of the interests considered important at the present day. There was no popular interest in science, no appreciation of secular literature, no art, no drama, no forms of higher amusements. The natural impulses were considered evil, and a moody introspection of one's sins a virtue.

On the practical side, the New England settlers were small farmers, fishermen, shipbuilders, sailors, and merchants. There

[2] Elson, *History of the United States*, p. 128.

[3] Green, *Short History of the English People*, chap. viii.

was little manufacturing, most necessary articles being made in the home. The farmer was generally his own mechanic, and the women made a variety of products. G. Stanley Hall has enumerated about sixty trades that were represented in the activities of a New England farm.

The importance of keeping in mind the industrial activities of the household, and neighborhood in a study of colonial education has been emphasized particularly by Dr. Dewey in his *School and Society*.

> The household was practically the center in which were carried on, or about which were clustered, all the typical forms of industrial occupation. The clothing worn was for the most part not only made in the house, but the members of the household were generally familiar with the shearing of the sheep, the carding and spinning of the wool and the plying of the loom. Instead of pressing a button and flooding the house with electric light, the whole process of getting illumination stood revealed in its toilsome length, from the killing of the animal and the trying of the fat, to the making of wicks and dipping of candles. The supply of flour, of lumber, of foods, of building materials, of household furniture, even of metal-ware, of nails, hinges, hammers, etc., was in the immediate neighborhood, in shops which were constantly open to inspection and often centers of neighborhood congregation.[4]

These were the activities and interests for which education had to prepare. Let us see what provision was made for them in elementary schools. The well-known preamble to the law passed by the Massachusetts General Court in 1647 is the clearest expression of the religious basis of this education. The same preamble is copied in the Connecticut law of 1650, the phraseology being slightly improved.

> It being one chief project of that old deluder, Satan, to keep men from a knowledge of the Scriptures, as in former times, keeping them in an unknown tongue, so in these latter times, by persuading them from the use of tongues, so that at least, the true sense and meaning of the original might be clouded by false glosses of saint-seeming deceivers; and that learning may not be buried in the grave of our fore-fathers [the court decreed that whenever a township increased to fifty householders they should employ someone] to teach all such children as shall resort to him, to write and read.

[4] P. 22.

An earlier Massachusetts ordinance of the year 1642 had required parents and masters of children to train the latter "to read and understand the principles of religion and the capital laws of the country." The Connecticut law of 1650 made the same requirement, with additional religious training as follows, "That all masters of families, do, once a week, at least, catechize their children and servants in the grounds and principles of religion."

The work of elementary education is definitely stated in these laws. It is to be writing and reading, a knowledge of the principles of religion and the capital laws, and the learning of the catechism.

The chief work of the school came to be the teaching of the two formal subjects, writing and reading. There is no mention of spelling, arithmetic, composition, drawing, singing, object-study, physiology, nature-study, geography, history, secular literature, or manual training. For the purpose of rural New England Puritan life even writing was of minor importance. Reading was the all-important subject. Our first systems of American elementary schools were fundamentally reading schools for religious purposes.

Such was the training given in elementary school. But there was another kind of training of importance provided in the same laws, but not given in the schools. It was training in industrial activities. As stated in the Connecticut law of 1650 the requirement reads:

> that all parents and masters do breed and bring up their children and apprentices in some honest lawful labor, or employment, either in husbandry or some other trade profitable for themselves and the commonwealth, if they will not nor cannot train them up in learning, to fit them for higher employments, and if any of the selectmen, after admonition by them given to such masters of families, shall find them still negligent of their duty, ... the said selectmen, with the help of two magistrates, shall take such children or apprentices from them, and place them with some masters for years, boys until they come to be twenty-one, and girls to eighteen years of age complete.

The Massachusetts law of 1642, the Pennsylvania law of 1683, and other colonial laws made similar provisions.

Thus we find compulsory industrial education provided for

very early, in fact at the same time as schools for teaching to read. This training for a trade, together with the many things learned in the home, and the narrow interests and austere life of the New Englanders, enable us to understand why such narrow and specialized instruction was left to the elementary school. It is essential that the student keep in mind the industrial training formerly received outside the school, in order to appreciate recent developments in elementary education.

Elementary education of the early type continued with little change to the Revolution. Reading and writing were fundamental; spelling and arithmetic were added.

Little change occurred in the instruction offered in the American elementary schools from their establishment to the time of the Revolutionary War. They remained primarily reading-and-writing schools, with one or two other subjects for older children. This is evident from the account given by Noah Webster of the schools in which he had been educated. I quote his statement because it presents very definitely and concretely what is shown by other accounts to have been the common practice. Spelling and arithmetic had been added to the work of the elementary schools, otherwise there was little change. Webster's account is as follows:

> When I was young, the books used were, chiefly or wholly, Dilworth's *Spelling Books*, the Psalter, Testament, and Bible. No geography was studied before the publication of Dr. Morse's small books on that subject, about the year 1786 or 1787. No history was read, as far as my knowledge extends, for there was no abridged history of the United States. Except the books above mentioned, no book for reading was used before the publication of the third part of my *Institute*, in 1785. In some of the early editions of that book, I introduced short notices of the geography and history of the United States, and these led to more enlarged descriptions of the country. In 1788 at the request of Dr. Morse, I wrote an account of the transactions in the United States, after the Revolution; which account fills nearly twenty pages in the first volume of his octavo editions.
>
> Before the Revolution, and for some years after, no slates were used in the common schools: all writing and the operations in arithmetic were on paper. The teacher wrote the copies and gave the sums in arithmetic;

few or none of the pupils having any books as a guide. Such was the condition of the schools in which I received my early education.

The introduction of my *Spelling Book*, first published in 1783, produced a great change in the department of spelling.

No English grammar was generally taught in common schools when I was young, except that in Dilworth, and that to no good purpose. In short the instruction in schools was very imperfect.[5]

A concrete picture of the work of elementary schools in Boston at the beginning of the nineteenth century, may be found in the reminiscences of Henry K. Oliver, who attended them. He went to three grades of school, first the A B C school, second the reading school, and then the Latin grammar school. We are not concerned with the latter which was to prepare for college, but will follow his career in the elementary school.

A B C SCHOOL

In the year 1805, or thereabouts, being then something under five years of age, I was consigned to the care of one Mr. Hayslop, who, with his wife and widowed daughter, kept school in an old building. By him I was taught my A, B, C, D, E, F, G, my a, b, ab's and my e, b, eb's, after the old, old way—praised because ancestral—the old gentleman holding an old book in his old hand and pointing, with an old pin, to the old letters on the old page, and making each of us chicks repeat their several names till we could tell them at sight, though we did not know what it was all for. We must have been a bright set, excellent of memory, for with this excellent old method, and with the excellent old books of the old times, and the excellent old teacher, and our own excellent young wits, we were not more than four or five weeks in acquiring complete knowledge of the twenty-six arbitrary marks constituting the English alphabet. To be sure, I learned the names, family and Christian, of all my fellow-scholars, and they were quite a host, in a week; but that was, as it were, naturally—by instinct, as Falstaff knew the true prince—while to learn the letters must only be done after the good old fashion of the ancestral teaching, the teachers of those days holding faithfully to the first line of Pope's couplet:

> Be not the first by whom the new is tried,

And wholly ignoring the second:

> Nor yet the last to lay the old aside.

DAME SCHOOL OR READING SCHOOL

From this school I was removed to another, Madam Tileston's, in Hanover, below Salem Street, of the same general character, where I was

[5] Barnard, *American Journal of Education*, Vol. XXVI, p. 196.

taught elementary reading and spelling, after the same ancestral fashion—that is, I received about twenty minutes of instruction each half day and as school was kept three hundred and sixty minutes daily, I had the privilege of forty minutes' worth of teaching, and three hundred and twenty minutes' worth of sitting still (if I could), which I could not—playing, whispering, and general waste of time, though occasionally a picture-book relieved the dreary monotony.

My nervous temperament, dislike of confinement at busy nothingness, want of affection for books—slates then we had none—love of mischief, and general habit of fidgetiness, often entitled me to Madam Tileston's customary punishment of sundry sharp taps on the head, with the middle finger of her right hand; said finger being armed, for its own defense, with a large and rough steel thimble.

Both of these teachers taught as well as they knew how—and as well as the times in which they lived and worked permitted them to know. Nobody taught any better so far as I have learned. Nor was there anything like the philosophy of teaching known or thought of, so far as I can judge on retrospection, by any teacher into whose hands I fell.

There were no schools systematically graded; there were no blackboards; there were no globes, nor ordinary apparatus in schools I attended. I never saw a full-sized map, nor illustrative picture of any sort suspended against the school wall.[6]

There was no object-teaching; in fact, there was no teaching at all, in the modern sense of the word. The master's time was all consumed with hearing lessons, making pens, setting copies, and keeping order.

The account given of New England education from its origin to the Revolutionary War has shown the following general points: (1) that elementary schools were established primarily to teach children to read the Bible and other religious literature; (2) that compulsory industrial training was provided for by law; (3) that little change had taken place up to the Revolution, the main purpose of the schools continuing to be the teaching of children to read and write.

This development of elementary education in America is paralleled by similar developments in many of the countries of Europe, particularly those in which the spirit of the Protestant Reformation was strongest. In some of the Catholic countries, the Catholic Reformation (or so-called Counter Reformation),

[6] Barnard, *American Journal of Education*, Vol. XXVI, p. 209.

resulted in a similar general establishment of schools in which children were trained in reading and writing, and in a knowledge of religious texts. Most notable among the Catholic schools were those maintained by the Brethren of the Christian Schools, particularly in France. The schools of this order (which was founded in 1684) were superior to practically all other schools of that period in two respects. They were taught by teachers who had been trained in the normal schools maintained by the brethren, and they used the method of simultaneous or class instruction, instead of the method of individual instruction which was almost universally used. England was most backward in providing elementary education, almost no provision being made until the nineteenth century.

The accounts ordinarily given of elementary education during this period describe at length the development in Germany in connection with the Lutheran Reformation. In order to show that the educational development in this case was similar to that which I have described in the case of the Puritan Reformers in New England, I shall give a summary statement of the German situation.

A very close parallel to the New England laws requiring schooling in reading and writing, and the learning of a trade outside of school, is found in this statement by Luther: "My opinion is that we must send the boys to school one or two hours a day, and have them learn a trade at home for the rest of the time. It is desirable that these two occupations march side by side." It will be remembered that Luther prepared a very careful translation of the Bible into German and wrote two catechisms as a further aid to individuals in arriving at religious truth. Paulsen says, "Instruction in reading and catechism, which were to pave the way for the general use of the Scripture and assist in its interpretation, was the root-stock from which has grown up the Protestant elementary school."[7]

The religious motive continued to dominate the German elementary schools to the nineteenth century. The curriculum as represented in the Prussian regulations of 1763 provided only

[7] *German Education*, p. 75.

for reading, writing, religious instruction, singing and a little arithmetic and some "general information about God, the world, and mankind."[8]

The German elementary teachers were men either incapacitated for other employment, or teaching to supplement their scanty earnings at some other trade. Describing these Paulsen says:

> As late as 1738, the Prussian country schoolmasters were granted the tailoring monopoly within their respective villages for the improvement of their economical position. Some reading and writing, with the addition, at most, of a little arithmetic, was, of course, all that such men could manage; method of any kind was out of the question. It is not surprising, therefore, that, in many cases, the instruction never went beyond the first rudiments. Even in schools of a little higher standing, especially where the attendance was irregular, many children never achieved anything beyond a little reading and knowing a few things by heart. [For many] the instruction was never anything else but a torture, protracted through years, from saying the alphabet and formation of syllables to the deciphering of complete words, without any real success in the end, while writing was nothing but a rough and wearisome tracing of the letters, the net result of all the toil being the gabbling of the Catechism and a few Bible texts and hymns, learnt by heart over and over again.[9]

Such is the history of modern elementary-school practice, from its beginning in the sixteenth century to the end of the eighteenth. There was very little change in content, and practically no change in methods of instruction, during a period of one hundred and fifty years in America, and two hundred and fifty years in Germany. Contrast this with the remarkable change that has taken place during the last hundred years, a change in the whole conception of elementary education, its purpose, its content, and its method. The changes in this one century, are far more significant for teachers than all the development in elementary education in the previous history of the world. They were initiated by Rousseau and established in practice by Pestalozzi and his followers. The history of this practice will be traced in subsequent papers.

[8] *Ibid.*, p. 139. [9] *Ibid.*, p. 141.

SUGGESTIONS FOR GROWTH OF BULBOUS PLANTS IN SCHOOLROOMS AND SCHOOL GARDENS

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The bulbous plants that are best for schoolroom,[1] home, and school garden or lawn uses are tulips, hyacinth, narcissus, crocus, gladiolus, freesia, and amaryllis. Many others may be added to this list by persons experienced in growing plants. There are several varieties of each of the kinds named as, single and double tulips, single and double hyacinths, varieties in color, etc. For work with children it is usually best to use the less specialized and more common forms, since success in growing them is more probable and they are no less interesting, attractive, and instructive.

Any dependable seed salesman can supply these bulbs or they may be ordered direct from one of the large supply houses as Vaughn's Seed Store, Chicago, Ill., or Peter Henderson & Co., New York City, N. Y. Prices will vary with the kind of bulb, also with the particular variety desired. The usual range in price is suggested in connection with the discussion of each kind of bulb. Suggestions for planting are based upon the climate and seasons of the Chicago region.

All of the plants here mentioned thrive best in good loamy soil. If manure is used it should be thoroughly decayed and the soil should be thoroughly mixed. It is best to use soil that has been enriched some time prior to the time of planting in order that no undecayed organic matter may be present. Plant no bruised or defective bulbs since they may become a source of infection of others.

Planting for indoor flowering may be done in earthen pots or in wooden boxes. Care must be taken to secure adequate drain-

[1] These preliminary directions are inserted in advance of the general series of articles on nature-study so that teachers who wish to follow the suggestions of the articles may have suitable material at hand.

age. In general, planting in pots should be done at the same time as in outdoor beds, namely about four or five weeks before the first freezing of the ground is expected, though successful indoor planting may be done at a later period. In all cases after bulbs are properly placed in pots or boxes, water well and place in cold frames, in pits in the ground, or in a dark, cool basement room. Keep moist but not wet by an occasional watering. In this way roots grow from the bulbs and become well established before leaves develop and good strong plants may thus be secured. From the cold frames or basement room the pots may be taken to the schoolroom at any time after six weeks or more, and with proper care good flowering plants should soon be secured. During chilly nights partial or complete protection against low temperature may be secured by covering the plants with heavy paper cones made from newspapers.

1. *Tulip, hyacinth, narcissus, and freesia.*—These bulbs are the most widely used for school garden and indoor work. They cost from ten cents to seventy cents and more per dozen. The above directions cover most of the points necessary for proper growing. In beds or in pots the bulbs should be planted with the tops three inches from the surface. In beds best results are secured by planting so that each bulb is allowed at least eight or nine square inches of earth. In pots closer planting is usual, as two or three bulbs in a six-inch pot. Narcissus may be grown in a dish of water with a few stones to serve as supports for the roots.

2. *Crocus.*—Cost, about fifty cents per hundred. This plant is for outdoor planting but often flowers well indoors. Excellent results may be secured by scattering the corms (bulbs) about in the lawn, since they flower early in the spring and appear to best advantage when they come up in irregular distribution. The use of several colors increases their attractiveness. Plant in early November. By use of a stick an inch in diameter make a hole in the sod about three inches deep. Insert the corm with its root end downward and press soil so that it is close upon the bulb. The corms need no further attention and if undisturbed will flower for several years. For indoor growth plant six or eight

bulbs in a four-inch pot in good black soil. Plant so that the tops of the bulbs are 2½ to 3 inches below the surface, and care for them as suggested in preliminary directions.

3. *Gladiolus.*—Cost, thirty to sixty cents per dozen. These plants are useful for outdoor planting and should be planted in the spring so soon as all freezing is past. Since they grow to a height of two to four feet they appear best, and are best protected from winds, if planted along a fence or wall. A bed a few inches wide should be prepared and the bulbs planted in a row with the tops about three inches from the surface of the soil. The corms should be three inches apart in the row. In the spring the soil should be carefully tilled.

4. *Amaryllis.*—Since these plants cost from twenty-five cents to one dollar and more each they are not recommended for general use, but one or two kept by a room of pupils will prove of value. From November to February or March the pots containing the bulbs should be set in a dark cool place since this is the normal dormant period of the plant. By care the plants may be kept from year to year increasing in vigor and flowering qualities.

EDITORIAL NOTES

The Science of Education

The educational world has been waiting for some scientific man or other to supply the necessary facts on which to base the "new education." Sometimes it is the psychologist who has seemed to be the most promising source of this much-dreamed-of reform. With an eagerness almost pathetic, teachers have rushed to the various psychologies and have read them in the hope of finding there the solutions of their school problems. The reaction has often been as violent as the first enthusiasm. The psychologies do not solve school problems and the teachers discovering this have complained bitterly against the writers of books on psychology. Sometimes the biologist has been consulted. If we could only find out how nature brings up young animals, if we could only know the formula of evolution by which animal life has been raised from the lower to the higher forms, then surely we should have an answer to our questions of school reform. But here again the teacher is confronted by the result that the school must be different from the playground and that the problems of social heredity differ from the problems of physical heredity. The biologist cannot solve with his formulas the problem of the schools.

The trouble in all these efforts to borrow a science of education is that the field of educational activity is a special field and requires special research. Educators cannot evade the problem by going to specialists in other fields. There must be a direct attack upon the problems of education by students of education. If we wish to teach spelling well why should we wait until the psychologist in the midst of his various discussions drops a few remarks here and there which will be applicable to our problem? Why should we not rather organize a direct investigation of spelling? If oral reading is a problem, why not take it up? We may go to the biologist and the psychologist and the sociologist and the student of all the related sciences for suggestions, but

we can never deal with these problems until we take them up as distinct problems worthy of the energies of well-trained students.

Why has there been such delay in the development of a science of education? Because educators have been such busy folk dealing with the problems of classroom management and schoolroom organization. Curiously enough the leaders in practical education have been taken by their duties farther and farther away from the problems of educational research. The principal or superintendent chosen because of his ability as a teacher has been set doing clerical work and solving financial problems rather than studying education. The high school specialist, and above all the college professor, absorbed in their special lines of study, have never had time to consider themselves and their activities as suitable subjects for investigation. We are all disposed to think of everything except our own activities as suitable matters for scientific examination. The world examined scientifically the remote objects of nature before developing a science of physiology or sociology or psychology. And so the educator has been a close student of everything except his own activities as an educator.

It is time for a concerted movement in the direction of a special science of education. The time has come in our institutions of scientific research when there is a career for the student of educational problems. The time has come when teachers are sufficiently critical so that they can begin to appreciate genuine scientific discussions. Let us mark this new era as the era of a definite and distinct science of education which is to supersede all unsystematic borrowings from related sciences and all helpless waiting for someone else to do the task so obviously at hand for those interested in education.

NOTES AND NEWS

An account of educational conditions and school problems in the Panama Canal Zone, taken from the *Canal Record*, gives not only an interesting account of the peculiar problems that the cosmopolitan life of the zone presents, but it is interesting as throwing what might be called an exaggerated light upon many centers of population in our larger cities. There are school centers in Chicago and New York which present practically the same problems. For this reason the report is given in some detail.

In the work now in progress of grading the schools of the Canal Zone, three great obstacles are encountered: (1) the difficulty of harmonizing the points of view of people coming from hundreds of different places; (2) the absence and tardiness; (3) the constant changing of places of residence.

It is probable that, in its extent at least, the first of these problems is unique in education. In the Canal Zone schools for white children the 722 pupils represent over 500 different schools, and a score or more distinct educational systems. Thirty-six states, two territories, and the District of Columbia have representatives among the pupils, and the teachers themselves represent sixteen different states. Not only are the systems of the various states different, but in only a few of the states is there a thoroughly uniform system of education, so that each city or town has some distinct features in its school system.

Twenty-one different nationalities other than American are represented by pupils in the schools for white children, and practically every one of the alien children began school work under a system differing in some respects from that in which each of the others began.

It is not only in reconciling differences in methods of teaching that difficulty is experienced. Indeed the more elemental difficulty is that the attitude of children, parents, and teachers is fixed by conditions in the particular locality from which they come. A local coloring suffuses their thought and action. The teachers themselves are the product of local conditions, and no matter how advanced their professional training may be their work reflects their school education and professional experience. More than the teachers, the parents and children show a natural local pride in the schools of their home community, and this is occasionally reflected in their attitude toward the school system of the zone.

One phase of this local coloring is the conviction of teachers, parents, and children that the grading of the schools with which they are familiar should be the standard. To adopt their ideas would mean several hundred different standards. It is seldom that two schools can be found in the states in which the grading is exactly the same. In one school a certain grade will carry the student farther than it will in another, and if there is a general similarity of grading it will yet be found that in the extent to which some studies are pursued there is a difference. There is no harm in this where the community

schools take children from the primary grade through the high school, for there the change in the personnel of the student body is slight, and there is no conflict of grades. But in the zone schools each pupil has been started on a different scheme, each parent has his own confirmed idea of how a school should be graded and conducted, and each teacher has a similar difficulty in overcoming his local coloring.

The burden of readjusting himself and the pupil and reconciling the parents falls on the teacher. How well the Canal Zone teachers have overcome these difficulties may be judged from the fact that the work of grading is making good progress.

The constant changing of parents from one part of the zone to another is a condition that makes grading difficult, and will continue to do so until one standard has been thoroughly established. A school for white children at Gatun began the year last September with twenty-one pupils and by accretions from other parts of the zone this number has been increased to forty-six. In one of the schools for colored children there have been fifty changes in the past six months. This changing unsettles the children who are transferred and the school to which they go. It also adds to the absences.

The one great cause of absence in the schools for white children is the six weeks' vacation granted to "gold" employees engaged in the states. Practically every white child in the zone comes from a family which spends six weeks of the year away from Panama. A great majority of these are away from the Isthmus during six weeks of the school year, for it is not possible or desirable to let all employees have their vacation in the summer months. This condition in the schools for white children has led to the appointment of two teachers who, when not substituting, spend their time in the schools along the line of the canal giving special instruction to pupils who have missed school part of the year.

Among the colored children absence and tardiness are chronic and under present conditions are practically incurable, although efforts to lessen the absence and tardiness are not spared. A constant change of residence, indifference on the part of parents and children, the large number of pupils to each teacher, and the legal restrictions on the punishment of truants and sluggards are the more important obstacles in the way of curing absence and tardiness.

The following letter written by Commissioner Brown to *Science* is quoted in full in order to show the progress which is being made by the Bureau of Education.

The Bureau of Education at Washington, which has occupied for thirty-seven of the forty-two years of its existence the rented building at the corner of Eighth and G streets, northwest, was removed in July to the second floor of the old Post-office Department building between Seventh and Eighth and E and F streets, with storage and mailing rooms in the basement. Its new quarters are more commodious and much more comfortable than the old. This is the first time in the history of the bureau that it has been quartered in a government building.

A measure of reorganization in the staff of the bureau was made during the month of July. Mr. Lewis A. Kalbach, who has been connected with the bureau for twenty-two years and has served during the past three years as clerk

to the Commissioner in addition to his duties as specialist in land grant college statistics, has been appointed chief clerk of the bureau. He has been succeeded as specialist in land grant college statistics by Professor James E. McClintock, of the University of Maine, whose principal work will have to do with the relations of the federal government with the land grant colleges of agriculture and mechanic arts. The former chief clerk, Mr. Lovick Pierce, continues his connection with the bureau as chief of the correspondence division. Dr. Harlan Updegraff, who has served as chief of the Alaska division during the past two years, has been appointed collector and compiler of statistics, succeeding Mr. W. Dawson Johnston, who has been made librarian of Columbia University. Dr. Updegraff's principal duties will have to do with the relations of the bureau with the chief school officers of the several states and cities of the country. It is expected that he will serve as an advisor in matters affecting school administration.

Mr. William T. Lopp, who has served as district superintendent of schools in Alaska, has been appointed superintendent of education of natives of Alaska and will have direct charge, under the supervision of the commissioner of education, of education and the reindeer industry among the Alaskan natives. He will divide his time between Alaska and Washington and will have charge of the Alaska division of the bureau.

Some time will be taken in closing up the special work upon which Dr. Updegraff and Mr. Lopp are now engaged, in the Alaska service, and it is expected that they will not enter their new duties before November or December.

Arrangements have been made by the Bureau of Education and the Bureau of the Census for the collection by special census agents of financial statistics of the school systems of the larger cities. The statistical form used by the Census Office will be furnished shortly by the Bureau of Education to a number of these cities that cannot be reached this year by the census agents. This form is the outcome of a conference between the two offices concerned. It is still in an experimental stage, but its use by the Census Office and the Bureau of Education is expected to develop any defects or weaknesses in it, and lead to the adoption of a form that will meet the conditions existing in the various cities of the country.

Another forward step has been taken as regards the prompt issuance of the *Annual Report of the Commissioner of Education*. On certain conditions, which can undoubtedly be met, the public printer has agreed to furnish bound copies of Volume I of the *Annual Report* for 1909 on December 1 of this year, and Volume II on March 1 of the year 1910. In view of this arrangement, it may now be confidently expected that the first volume, containing general surveys, directories, etc., will be in the hands of readers before the convening of those educational associations which meet during the holiday season; and the second volume, containing the statistical tables, will be received prior to the Easter vacation meetings.

BOOK REVIEWS

Laggards in Our Schools: A Study of Retardation and Elimination in City School Systems. By LEONARD P. AYRES, A.M. New York: Charities Publication, 1909. Pp. 120.

This is the second volume which has appeared as a result of the Backward Children Investigation conducted by the Russell Sage Foundation under the general direction of Dr. Luther H. Gulick, a preliminary report of the work having been published under the title of *Medical Inspection of Schools* by Dr. Gulick and Mr. Ayres. Several of the chapters of this book have appeared as articles in the *Psychological Clinic* and elsewhere, and a report of the study in as far as it related to the New York City schools has been incorporated in the annual report of Superintendent Maxwell for 1908.

The book, although very clearly written, is not a merely popular discussion of the subject as the wording of the title might lead one to suspect, but gives evidence of careful research, of keen analysis of the material presented, and of much insight into statistical procedure.

The most significant of the general results as summarized by Dr. Gulick in an introductory statement are:

"(1) That the most important causes of retardation of school children can be removed;

"(2) That the old-fashioned virtues of regularity of attendance and faithfulness are major elements of success;

"(3) That some cities are already accomplishing excellent results by measures that can be adopted by all;

"(4) That relatively few children are so defective as to prevent success in school or in life."

The class of pupils made the particular object of study are the so-called "retarded" pupils. A special meaning is attached to this word. Children "who are older than they should be for the grade they are in are considered 'retarded.'" The term, therefore, covers both "those who are over-age on account of slow progress and those who have progressed normally but entered school late." As used, the word does not, therefore, necessarily denote a pathological condition, but simply the school status. A justification for this use of the term is given in chap. iv.

From a study of the data from 31 cities, it is concluded that "approximately one-third of all of the children in our city schools are above the normal age for their grades—they are retarded." There is a very considerable variation between the various cities and even between the schools of the same city (New York City). One city showed but 7.5 per cent. of retardation, while at the other extreme one city is cited as showing 75.8 of retardation. Differences of over 25 per cent. were found in different schools in New York City. A careful analysis of the effects of the factors of population, retardation, and elimination on the number of pupils in the succeeding grades is made in chap. iii, and on the basis

of the method there established a comparison and criticism is made in chap. vi of the "Elimination Study of the Bureau of Education." The results presented differ from the latter study in presenting evidence to show first that "the general tendency of our schools is to hold practically all of the pupils to the sixth grade," and, in the second place, that about one-half of the pupils who enter school finish the seven or more grades. The earlier study argued that this proportion was about one-third, and that extensive elimination began with the third grade or earlier.

Some of the more detailed results of general interest are as follows:

"It is safe to count on 10 per cent. of the children leaving on reaching the age of thirteen, 40 per cent. by the time they are fourteen, 50 per cent. of the remainder at fifteen, and again 50 per cent. of the remainder at the age of sixteen."

The same fact stated in terms of the grade reached is that "the general tendency of city school systems is to keep all of the children to the fifth grade, to drop half of them by the time the eighth grade is reached and to carry one in ten to the fourth year of the high school."

"According to the New York investigation, among each one hundred retarded pupils thirty are retarded because of late entrance; thirteen because of late entrance and slow progress; and fifty-seven because of slow progress.

"The courses of study of our city school systems are adjusted to the power of the brighter pupils. They are beyond the powers of the average pupils and far beyond those of the slower ones."

"The average pupil cannot complete the work of eight grades in eight years. So far as can be ascertained, in no city does the average child regularly succeed in doing each year's work in one year. The average child in the average city school system progresses through the grades at the rate of eight grades in ten years."

There is little or no relation between foreign birth or parentage and retardation in school; "ignorance of the English language does not constitute a serious handicap."

Physical defects have, as has been well established, an important bearing on the progress of school children. Especially is it true that there are more dull children suffering from enlarged glands, defective breathing, and adenoids than there are of bright children.

Irregular attendance is an important cause of retardation and is very prevalent. "Such figures as are available indicate that in our cities less than three-fourths of the children continue in attendance as much as three-fourths of the year."

The factor of sex is also important, and very instructive results are presented in this connection. Retardation among boys in elementary schools is shown to be 13 per cent. more prevalent than among girls. The conclusions drawn seem warranted by the data presented that "our schools as they exist are better fitted to the needs and natures of the girl than of the boy pupils."

The age of the pupil is a further important element in retardation and elimination. The age of starting to school is not, however, the controlling factor, but the retention of pupils at the upper ages.

"The reason why retention at the upper ages and not age at starting is the controlling factor in securing a large percentage of survivors is that our school

courses are too difficult to be completed in eight years by the average child who starts at the age of five, six, or seven, and our systems of grading are too inflexible to permit the more mature child to make up the handicap he is under through late start."

The children who start late to school are apt to progress more rapidly than those who start early, but most of the former never graduate. "Those who start early are the ones most likely to finish."

Remedial measures and means for increasing the efficiency of schools in the matters of the advance and progress of pupils are discussed in concluding chapters.

The results of the study, as outlined above, are very evidently of much importance in the general administration of our public schools, and should lead to further studies at first hand by school superintendents and by grade teachers in their own school systems.

WALTER F. DEARBORN

THE UNIVERSITY OF CHICAGO

BOOKS RECEIVED

B. D. BERRY & COMPANY, CHICAGO

Berry's Writing Books. Books I, II, III, IV, V, and VI. Paper covers. Illustrated.

Teaching Writing, Part II. Material and method for teaching *Berry's Writing Books.* Paper cover.

T. Y. CROWELL & COMPANY, NEW YORK

Exercises in French Conversation and Composition. With Notes and Vocabulary. By GUSTAV HEIN. Cloth. Pp. 120. $0.40.

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When America Won Liberty, Patriots and Royalists. By TUDOR JENKS. Cloth. Illustrated. Pp. 280. $1.25.

D. C. HEATH & COMPANY, BOSTON

Finger Play Reader ("The Davis-Julien Readers"), Parts I and II. By JOHN W. DAVIS AND FANNY JULIEN. Cloth. Illustrated. Part I, 134 pp.; Part II, 134 pp. $0.35, ea.

PERSONALLY PUBLISHED

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HOUGHTON, MIFFLIN COMPANY

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IRENE WARREN
Librarian, School of Education, the University of Chicago

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[1] Abbreviations: Atlan., Atlantic Monthly; Craftsman, The Craftsman; Educa. Rec., Educational Record; Educa. T., Educational Times; Engin. N., Engineering News; Harp. W., Harper's Weekly; Journ. of Educa., Journal of Education; Lib. Journ., Library Journal; Liv. Age, Living Age; Nat. Study R., Nature-Study Review; Out., Outlook; Pedagog. Sem., Pedagogical Seminary; Pop. Sci. Mo., Popular Science Monthly; Pub. Lib., Public Libraries; Relig. Educa., Religious Education; Sch. World, School World; Sci. Amer., Scientific American; Scrib. M., Scribner's Magazine; South. Educa. R., Southern Educational Review; Story Hour, The Story Hour; Teach. Coll. Rec., Teacher's College Record.

New York Public Library
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CIRCULATING DEPARTMENT

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